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PMIC-MA03-469-26

DATA REQUIREMENT (DR) MA-03

PAYLOAD MISSIONS INTEGRATION
PROGRESS REPORT

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(WBS 05.1)

January 28, 1983



Contract Number: NAS8-32712

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ABSTRACT

This document summarizes Teledyne Brown Engineering's (TBE) progress on the Payload Missions Integration Contract (PMIC) during the report period from November 16, 1982, through January 15, 1983. It fulfills the requirements of Data Requirement (DR) MA-03 Progress Report.

J. G. Robinson
for R. A. K. Mitchell
Payload Missions Integration Division

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1. INTRODUCTION

This report is organized for use by the Spacelab Payload Project Office (SPP0). The Management Summary summarizes the contents of the report. The General Section provides information which concerns two or more missions or is non-mission oriented. The Missions' Sections provide information relative to payload integration progress on the specific missions for which TBE is responsible in its PMI contractor role.

Within each section of the report, information is organized in Work Breakdown Structure (WBS) number sequence. Only active WBS elements are identified by number and title for reporting purposes.

2. MANAGEMENT SUMMARY

Highlights of the PMIC contract effort during this period are summarized below.

General

The following are activities of a general or contract-wide nature that took place during this period:

- The Payload Operation Control Center (POCC) Maintenance and Verification Support System special study is approximately 95 percent complete.
- A full-time Quality Assurance Manager was assigned to the PMIC contract and a quality specialist was assigned to our Assembly and Integration (A&I) facility.
- Three Contract Supplemental Agreements (SAs) incorporating eight Charge Order Modifications (C/O Mods), two Engineering Change Proposals (ECPs), and adding the OSS-4 Mission to the contract were signed. They added 215,442 hours and \$6,482,778 to the contract effort.
- Negotiations were concluded on another SA which will incorporate three C/O Mods and several no-cost ECPs. It will add 49,763 hours and \$1,368,790.
- Responses were submitted for 10 other C/O Mods and responses to six others are now in preparation.

Spacelab Mission No. 1

Significant activities/achievements in the Spacelab (SL)-1 effort include the following:

- The design of flight stowage container simulators was completed. The stowage design status and design recommendations were presented to SPP0 on December 16, 1982.
- The Electromagnetic Compatibility (EMC) Analysis Report was revised to reflect new European Space Agency (ESA) experiment data.

- Mission Manager's Payload Integration Support at Kennedy Space Center (KSC) continued with four major activities started and/or completed.
- The coupled loads rerun was evaluated for all Spacelab Payload and Integration Coordination in Europe (SPICE) hardware, 14 U.S. experiments, and integrated racks 4, 9, 11, and 12. No excess loads were determined.
- Flight operations activities increased as documentation is finalized and training expands for the October 1983 launch.

Spacelab Mission No. 2

Significant activities/achievements in the SL-2 work include:

- Fabrication of the Payload Clamp Assembly (PCA) Pallet Fixture and ESA Hardware Simulators was completed.
- Fabrication of Cruciform modification parts is underway.
- Design activities were started on the Experiment 14, Vehicle Charging and Potential Instrument (VCAP), MPE design and integration. Experiment element locations and preliminary clearances were established.
- The Ground Operations Review (GOR) issue of the Ground Integration Requirements Document (GIRD) was issued on December 30, 1983.
- Initial Experiment Simulator Model Requirements (ESMRs) for Experiments 8, 10, and 14, and baseline ESMRs for Experiments 6 and 11 were delivered.

Spacelab Mission No. 3

Significant activities/achievements in the SL-3 work include:

- Modification of the Fluid Loop Pump Controller was completed and accepted by TBE quality.
- Delivery of MPE drawings for baselining has started. Drawings for four assemblies have been delivered thus far.

- Initial integrated SL rack structural and dynamic analyses were completed on the five PMIC racks. All racks analyzed showed negative margins of safety. Fixes are being developed.
- We supported several experiment GORs, updated Instrument Interface Agreements (IIAs) with GOR data, and updated the GIRD for the Integrated Payload (IPL) GOR to be conducted in February 1983.
- We participated in the Phase II Safety Review at Johnson Space Center (JSC) on December 6-7, 1982.
- Three IIAs have been submitted to SDPO for baselining; all are scheduled for delivery by February 8, 1983.

Office of Space and Terrestrial Application (OSTA) Partial Payloads

Highlights in this area were:

- The SNOO1 OSTA-2 flight configuration MPE Support Structure (MPSS) and structural/mechanical MPE were delivered to KSC on January 12, 1983.
- The SNOO2 MPSS was shipped to JSC on December 13, 1982.
- Detailed design drawings of OAST-1 MPE are 25 percent complete. Other preparations for the IPL Final Design and Operations Review (FDOR) are underway.
- Design modifications and analyses for generic MPSSs (SNOO3 and subsequent) were completed. ECP 75F reflects the changes.
- We participated in the OSTA-2 Phase III Safety Review at JSC on December 9, 1982.
- Preparations for the MEA-1 IPL FDOR are underway.

Office of Space Science (OSS)-4 Mission

Significant activities were:

- The OSS-4 Cruciform Compatibility study was completed and submitted on schedule. The Cruciform configuration was subsequently selected.

- Payload configuration studies and analyses are underway.
- IIAs for the Wisconsin Ultraviolet Photopolarimeter Experiment (WUPPE), Hopkins Ultraviolet Telescope (HUT), and Ultraviolet Imaging Telescope (UIT) are near completion. First draft copies will be delivered to Principal Investigators (PIs) in January 1983.

Premission Definition

Highlights in this area were:

- The MEPHISTO Facility Accommodations Assessment Study was completed this period. The final report was submitted on December 14, 1982.
- The Evaluation of End-to-End Costs of Spacelab Missions Study continues. An overview of SL-6 integration costs is scheduled for January 19, 1983.

Mission Peculiar Equipment Support Structure

Significant activities/achievements in the MPESS effort include:

- Piece part fabrication for MPESS SN003 and SN004 continued this period.
- ECP 63F, MPESS End Fitting Redesign for SN003 and SN004 was approved.

3. GENERAL

WBS 05.0 - PROJECT MANAGEMENT

WBS 05.1 - Performance Management and Administration

The project management contract deliverables this period were the DR MA-04, Financial Management Reports submitted on December 14 and January 14, and the DR MA-03, Progress Report submitted on November 24, 1982.

Three SAs were signed and incorporated into the contract (SA MSFC-161, 167, and 180) and one other SA (MSFC-185) was negotiated and is being finalized. SA MSFC-161 incorporated five C/O Mods (MSFC-105, 111, 113, 127, and 131) and added 77,316 hours and \$2,391,432 to the contract effort. SA MSFC-167 added the OSS-4 mission to the PMIC contract and added 118,277 hours and \$3,627,720. SA MSFC-180 incorporated three C/O Mods (MSFC-120, 141, and 147) and two no-cost ECPs (61 and 63). This SA added 19,849 hours and \$463,626. SA MSFC-185 will incorporate three C/O Mods (MSFC-119, 154, and 162) and several no-cost ECPs. It will add 49,763 hours and \$1,368,790.

Responses were submitted to 10 C/O Mods during the period. C/O Mod MSFC-159 added hours for SL-1 WBS 35.1 MPE work, MSFC-166 dealt with MSFC Handbook 527 updating, MSFC-169 added SL-2 contract work, MSFC-170 added configuration management work for Mid-Deck Missions, MSFC-171 added WBS 05.5 Prepermission Definition hours, MSFC-172 added hours for SL-2 WBS 35.1 MPE work, MSFC-173 added SL-1 POC requirements effort, MSFC-177 deleted flight operations contract work on four ESA experiments, MSFC-179 added WBS 35.1 MPE material dollars for Mid-Deck work, and MSFC-181 added WBS 05.5 Prepermission Definition hours.

Responses are being prepared for C/O Mod MSFC-178 which amends the DR IR-11, GIRD contents and delivery schedule; MSFC-182 that adds an MPE inventory control function; MSFC-183 that adds SL-3 design and analysis effort; MSFC-186 that extends SL-1, -2, and 3 and OSS-4 configuration management effort; MSFC-187 that adds the SL-2 Multi-Layer Insulation (MLI) Blanket design task; and MSFC-188 that added hours and dollars for SL-3 WBS 35.1 MPE fabrication work.

There are currently 14 change proposals with cost impacts in the MSFC technical review or procurement processing cycle.

WBS 05.2 - Information Management

During this period, PMIC Information Management coordinated the reproduction of 573,457 pages in support of various SPP0 and PMIC documentation requirements. We added 89 new documents to our master files and coordinated, published, and distributed the November and December 1982 Spacelab Payloads and Applications and Technology Project Management Reports, and the November and December 1982 Materials Processing in Space Monthly Reports.

WBS 05.4 - Special Studies

The POCC Maintenance and Verification System special study effort is approximately 95 percent complete. All software (source code and DCL) is completed and ready for use. The system is user-friendly and menu driven. A tape containing all command procedures, source code, executable code, and system data files was delivered to NASA/MSFC on January 14, 1983. A listing of the tape was also delivered at that time. A preliminary version of the POCC Maintenance and Verification System User's Guide was completed and internally reviewed. Modifications to the document are being made as a result of the review.

The Configuration Requirements Processing Acceptance Report (CAR) conversion effort (IBM 370 to VAX 11/780) is completed. The modifications required for the CAR to be fully useful at MSFC are also complete. The programs have been tested for run time errors using a test tape with known errors. A telemetry CAR software program in the form of a VAX 11/780 compatible tape and a listing of the code was delivered to NASA/MSFC on January 14, 1983.

WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

WBS 75.10 - Safety and Quality Assurance

During this period, a full-time Quality Assurance Manager was assigned to the PMIC contract and a quality specialist was assigned to our newly opened A&I facility. Quality Assurance Audits of the TBE

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mechanical and electrical fabrication facilities and the A&I facility were completed.

Two DR IR-17, Noncomformance Summary Reports were submitted during this period, and the DR IR-16, PMIC Inspection System Plan was revised.

4. SPACELAB MISSION NO. 1

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WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

WBS 35.1 - Mission Peculiar Equipment (MPE)

The MPE activity for this period was limited to two items:

- One MS27484E12F35PA electrical connector was delivered to KSC on December 1, 1982.
- Two cable brackets, F1-30671 and F1-30672, are being fabricated. Expected delivery is January 21, 1983.

WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

WBS 75.2 - MPE DESIGN

The design of simulators for flight stowage containers was completed during this time period. Design drawings are being readied for baselining by the first week in February. The design status and recommendations for the SL-1 stowage design were presented to SPP0 on December 16, 1982. A concept for contingency stowage in a mid-floor container was presented. A KSC stowage operation meeting is scheduled for February with MSFC, KSC, and McDonnell Douglas Technical Services Company (MDTSCO) personnel.

WBS 75.6 - Electrical System Integration

The SL-1 EMC Analysis Report was reviewed and revised to reflect new test data for three ESA experiments. EMC waivers, affecting three ESA experiments and test reports on four ESA experiments, were also reviewed.

WBS 75.9 Ground Operations Analysis and Requirements Definition

We continued to support the SL-1 GIRD activities on a minimal basis. We prepared and distributed Change 23 to Revision B and reviewed five Engineering Change Requests (ECRs). We also started work on our response to C/O Mod MSFC-178 that required PMIC to define deintegration requirements for SL-1, SL-2, SL-3, OAST-1, OSTA-2, and MEA-1.

WBS 75.11 - Configuration Change Coordination and Processing

During this period, we continued to process ECRs and ECPs submitted to the SL-1 Configuration Control Boards (CCBs), both Level II and Level III MPE. We processed 26 ECRs, 24 Field Engineering Changes (FECs), four waivers, and four ECPs through the Level II CCB. We baselined two new drawings for control by the Level III MPE CCB. We continued to publish configuration status and open action item reports on a regularly scheduled basis.

We continued our interactive effort with KSC, tracing Level IV integration problem reports, FECs, and deviations approved against the GIRD. With Level IV integration complete, we concentrated on efforts to close these problem reports and FECs prior to Level III/II.

WBS 75.12 - Interface Agreements

NASA/ESA Interface Control Document (ICD) and IIA updating to incorporate approved ECRs continued. Change pages for ECRs were developed and released for NASA experiment IIAs.

WBS 75.13 - Integrated Payload Compatibility

The Mission Manager's Payload Integration Support at KSC continued to track and log FECs, update assembly and installation drawings, and participate in MSFC technical meetings. The following major activities were started and/or completed:

- A review of all 1100 problem reports, with a breakdown into disciplines, was conducted and sent to the Mission Manager and S&E personnel.
- Design of a large pallet cable support bracket was completed. It is currently being fabricated at TBE, Huntsville.
- TBE electrical technicians modified the installation of the Gore Cables into the flight connectors per the direction of a MSFC change order.
- We participated in the troubleshooting of MPE/experiment flight hardware to isolate operational problems.

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The SL-1 coupled loads rerun was evaluated for all SPICE hardware and the 14 U.S. experiments that PMIC has been assigned. All results were positive with no excess loads. Integrated Racks 4, 9, 11, and 12 were reevaluated for the same coupled loads rerun; no excesses were found.

Generic rack model verification continued. Some missing data was requested from SPICE through SPPD. This data is needed to verify the actual loads applied during the static test of the racks.

The Microwave Remote Sensing Experiment (1EA034) Fixation Bracket Analysis was reviewed and approved on January 6, 1983.

WBS 95.0 - PAYLOAD FLIGHT OPERATIONS INTEGRATION

WBS 95.1 - Onboard Flight/Mission Operations

We assisted in the preparation of revisions to the Payload Flight Data File (PFDF) Publications Handbook, the Fabrication and Distribution Handbook, and the Contents Definition document. Bob Cleveland completed the Program Critical Hardware Handling Certification course and was certified to hand-carry the PFDF as required. PFDF items were prepared to support crew training in the Payload Crew Training Complex (PCTC) and POCC Cadre training in the Huntsville Operations Support Center (HOSC). A middeck stowage locker was packed with training items and provided to the PCTC for use during training. Modifications were made to the packing arrangement as a result of suggestions made during training. Crew notebooks and orbit maps were obtained to support training. A list of the materials used to fabricate all drawings and procedures in the PFDF was submitted to JSC for certification for flight. We assisted in the initial effort to prepare Emergency Deorbit Procedures. Procedures for Atmospheric Emission Photometric Imaging (AEPI), 1ES019B and the Electrical Power Branching Distributor (EPBD) were fabricated and distributed. That portion of the Preliminary PFDF for which inputs were received was fabricated and delivered.

Data Display System (DDS)/Experiment Training Definitions were prepared and delivered for ESA Experiments 1ES017 and 1EA033 and for the

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U.S. AEPI experiment. Work was started on the DDS/Experiment Training Definition for ESA Experiment 1ES016. Support was provided for crew training in the PCTC on Experiment 1ES017. Simulator/Training Acceptance Review (STAR) preparation and conduct of the Simulator Acceptance Review (SAR) for AEPI were supported.

WBS 95.2 - POCC Requirements

POCC requirements Data Requirement Form (DRF) packages were prepared for transmittal to the U.S. PIs in preparation for baselining these requirements. As a follow-on to this activity, changes to the PL Integration Plan (PIP) and Annex 5 (POCC Requirements) to the PIP were prepared for coordination with JSC and the POCC user room layout was updated. In addition, work started on the preparation of a layout of the POCC Cadre Area. The Mission Control Center (MCC) 500 parameter list was updated and provided to the SAIL. The Experiment Computer Input/Output (ECIO) data subsets were updated and entered on the DRFs for the ESA experiments. Work continues on the ECIO data subsets for the U.S. experiments.

The major POCC data base activity during this period consisted of reviewing the existing subsystem input/output (IO) data base and updating the format locations, calibration coefficients, and limits. This was followed by a review of the latest Subsystem IO Instrumentation Program and Components List (IP&CL) (IS/WAS) list for comparison with the subsystem IO data base and modification of the data base as required. Work on the remainder of the POCC data base consisted of the following:

- The data base was restructured to reduce the number of user identification (ID) spaces to ten. This reduction caused a change to approximately 18000 numbers in the data base, including most user ID codes and DRF numbers. The accomplishment of this task was assisted by a software program provided by the SAIL.
- The MCC 500 parameter list was coded. The list was put in the AT card format for ease of maintenance.

- Error code changes and additions were made to the data base.
- Commands were added to the data base for Experiment 1EA033.
- The second POCC Cadre address space was extended to include Experiment Computer Operational Software (ECOS) parameters and additional ECIO parameters.

The complete POCC data base to include telemetry, commands, log/delog, and subsystem elements was delivered to SAIL in tape and listing form for transmittal to JSC.

During this reporting period, we assisted in the preparation and conduct of two POCC Cadre training sessions (December 7 and 9, 1982; January 13-14, 1983) and in planning for the training session scheduled for early March 1983. We assisted in the preparation and verification of the data bases used in the PCTC and HOSC to support these simulations and assisted in the verification of the added capability to send commands to the PCTC from a POCC terminal in the HOSC. We supported POCC communications training given to the PIs who were to participate in the December 7 and 9, 1982, POCC training sessions.

We attended an Integrated Simulation Working Group meeting at JSC on December 14-15, 1982 to participate in discussions on requirements for integrated POCC and MCC simulations to be conducted starting in the summer of 1983. Preparation of the POCC Operations Training Document to cover the results of Simulations 9 through 12 started at the conclusion of Simulation 12 and continued through the remainder of the reporting period. We assisted SAIL in planning the scheduling of and requirements for the remaining SL-1 POCC Cadre training sessions to be conducted at MSFC.

WBS 95.3 - Payload Data Processing Requirements

The Spacelab Data Processing Facility Requirements Document was updated and prepared for re-issue. The preliminary Orbiter Instrumentation (OI) parameter list and requirements document was prepared for coordination by SPP0. DRFs were prepared for the OI, Spacelab Post Mission Ancillary

(SPMA), and Verification Flight Information (VFI) data requirements. DRFs specifying the post-mission video product requirements were assembled into document form and submitted to the SPPPO for approval.

WBS 95.4 - Public Affairs Inflight Video and Photographic Requirements

Scene development of the middeck scenes was prepared for and then conducted at JSC during the period December 20-23, 1982. The scenes developed were: initial Spacelab ingress, a meal period, Emergency Egress Test, sleep restraints, deactivation and Spacelab egress, and awareness of position from the life science experiments. Data for inclusion in the TV/Photo Operations Book was obtained and a video tape was brought back to MSFC. We continued to update the TV/Photo Operations Book based on the data received from the scene development activity at JSC and on the results of crew training conducted in the PCTC. We participated in the POCC Cadre training simulations conducted on December 7 and 9, 1982, and on January 13-14, 1983, in preparation for manning the TV Ops position in the POCC during the mission. In preparation for the mission training, we developed and submitted the procedures to be used by personnel manning the POCC TV Ops position. In addition, data packages were prepared to assist in performing the TV Operations functions during the simulations. We attended meetings with the POCC Data Management Coordinator and personnel from JSC to develop compatibility procedures and to prepare for the simulations. We assisted SAIL in the selection of TV cameras and lenses to be used in the PCTC for crew training, and we assisted in the development of a ten-minute video tape of SL-1 scenes to be used by the SPPPO during briefings.

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SPACELAB MISSION NO. 2

WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

WBS 35.1 - Mission Peculiar Equipment (MPE)

The following summarizes the MPE procurement and fabrication activity and status:

- PCA Assembly Fixture and ESA Hardware Simulators
 - The Assembly Fixture was completed and is stored in our A&I facility.
 - All ESA Hardware Simulators were completed and will be installed on the Assembly Fixture.
- PCA Piece Parts
 - PCA piece parts fabrication continued. Approximately 75 percent of machining was completed.
- Cruciform
 - The Cruciform was moved from MSFC Bldg. 4708 to TBE on January 18, 1983. Fabrication of the components for the Cruciform modification was started January 13, 1983.
 - The Cruciform Assembly Fixture Stand was completed and is presently stored in our A&I facility. Other parts of the fixture are being completed and will be installed on the stand by February 18, 1983.
 - A purchase order for the new and modified Cruciform Thermal Blankets is being prepared and will be forwarded to Sheldahl by the end of January 1983.

WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

WBS 75.1 - Configuration Design

The revised Cruciform/Instrument Assembly drawings were submitted for review and baseline release. This documentation incorporated the changes resulting from the Instrument Pointing System (IPS) redesign..

Design activities were initiated on the Experiment 14 MPE design and integration. Experiment element locations were established which provide adequate clearances with the IPS and Experiment 7 dynamic envelopes and this data was input to the IIA.

WBS 75.2 - MPE Final Design

The PCA Assembly Fixture and the assembly/installation documentation was updated to incorporate the pallet interface data submitted by KSC.

Insulation blanket/installation documentation for Experiment 6 is progressing toward a February 18, 1983, submittal for baseline release.

WBS 75.6 - Electrical System Integration

Power requirements for accommodation of Experiment 14 were analyzed and engineering modifications to the EPBD were developed and submitted for a design change. The Cruciform mechanical drawings were reviewed for EMC compatibility and electrical bonding compliance.

WBS 75.9 - Ground Operations Analysis and Requirements Definition

During this period, the GIRD Part IV was updated to include Experiment 14, VFI, and ECOS. It was reissued for internal review on November 22, 1982. As a result of this review and a meeting with S&E and SPPO, minor modifications were made. The SL-2 IPL GOR GIRD issue and the Cruciform experiment installation procedure inputs were completed and delivered on December 30, 1982. Assembly and installation procedures for the SL-2 MPE are currently being written and reviewed.

WBS 75.11 - Configuration Change Coordination and Processing

We continued to process ECRs and ECPs against SL-2 baselined documentation. This effort encompassed the preparation of Program Control Number (PCN) folders, the tracking of the change data in the Standard Configuration Identification Tracking System (SCIT), the distribution of change evaluation requests, and the preparation and processing of change control board directives for SL-2 changes submitted to SPPO. We published a weekly SL-2 Open Action Report, K014, and a TBE Drawing Release List (DRL) which includes all SL-2 MPE Contract End Items (CEIs) being built by TBE. We baselined the MLI Support Frame Drawings and Parts Listing and continued to track and close deficiency notice (DN) actions assigned during the PCA/Cruciform FDOR.

We submitted the following ECPs which S&E is currently evaluating:

- TBE 70F, Change Remote Acquisition Unit (RAU) Heater Bus Block Mounting Rail Mounting Hole Pattern;
- TBE 71F, Revision of SL-2 Cruciform/Instrument Assembly to Accommodate IPS Redesign; and,
- TBE 72F, Incorporate KSC Pallet Hardpoint Location Measurement Data.

We provided inputs and required documentation for the SL-2 GOR and finalized plans to support the review activities and perform the DN control and secretariat tasks.

WBS 75.12 - Interface Agreements

The VCAP IIA was updated to reflect initial review comments and was distributed for a final review before baselining. ECRs were submitted to revise Experiment 13 mechanical and Command and Data Management Systems (CMDS) accommodations, update the Experiment 6 mechanical interface panel, reroute cabling and mounting hardware for Experiment 10, and relocate three VFI sensors on the Cruciform insulation. Ten approved ECRs were incorporated into the SL-2 IIAs and

they were distributed. ECRs are being developed to add the Experiment 3 PDP switch panel schematic, the Experiment 11 connector location, the Experiment 13 support structure dimensions, and the final update of the Experiment 14 IIA for baselining.

WBS 75.13 - Integrated Payload Compatibility

The Cruciform/Instrument Assembly FDOR update data package was submitted for review. This package included an update to the drawings, Metallic and Nonmetallic Materials List, Mass Properties and Structural Analysis. The Fracture Control Assessment is being prepared for submittal to the Fracture Control Board (FCB).

An Integrated Payload Requirements Document (IPRD) ECR is being prepared to incorporate Experiment 14, update experiment allocated resources, and random vibration criteria. Two ECRs were incorporated in the IPRD to update CDMS accommodations for Experiment 3 and heater control for RAUs 5 and 6.

WBS 95.0 - PAYLOAD FLIGHT OPERATIONS INTERGRATION

WBS 95.1 - Onboard Flight/Mission Operations

The initial ESMRs for Experiments 8, 10, and 14 and the baseline ESMRs for Experiments 6 and 11 were completed and delivered to the SAIL. The Design Interface Verification Simulator (DIVS) Phase II, which covers the addition of the scene generation and instrument pointing system to the Payload Crew Training Complex, was developed. The DIVS requirements document is 95 percent complete. Work continued on development of the baseline ESMRs for Experiments 8, 9, 10, and 13.

WBS 95.2 - POCC Requirements

POCC requirements for support of Experiment 14, obtained in telecons with the PI, were prepared on DRFs. A new layout of the POCC user rooms was prepared, adding the Experiment 14 requirements.

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WBS 95.3 - Payload Data Processing Requirements

The Spacelab Data Processing Facility Requirements document DRFs were updated with the comments provided by the implementer at GSFC. Open issues from the unsigned DRFs for Experiments 5 and 14 were worked and the appropriate changes were made to the DRFs. DRFs specifying the post-mission video product requirements were assembled into document form and submitted to SPP0 for approval.

6. SPACELAB MISSION 3

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WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

WBS 35.1 - Mission Peculiar Equipment (MPE)

Long-lead items are being ordered for the Atmospheric Trace Molecules Spectroscopy (ATMOS) Support Structure, Rack 4 MPE, and Fluid Loop MPE.

The Pump Package Controller was reworked by Hamilton Standard to revise the grounding scheme. The controller is back at TBE and will be mounted on the pump package prior to its off-gas test.

WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

WBS 75.1 - Configuration Design Definition

The updating of the Payload Bay assembly/installation drawing and Rack 4 assembly/installation drawing is nearing completion. A schedule for the preparation and release of the rack staging and assembly and installation drawings has been prepared and released.

WBS 75.2 MPE Design

The redesign of the MPE Fluid Loop bypass required by the Fluid Experiment System (FES)/Vapor Crystal Growth System (VCGS) experiments was started. We instituted a conceptual change in the MPE Fluid Loop to eliminate fixed orifices and to substitute adjustable metering valves. The design is being revised to accommodate these metering valves.

The following MPE items were submitted to MSFC for baselining: MPE Fluid Loop Control Panel, Payload Bay Payload Adapter, Ionization States of Solar and Galactic Cosmic Ray Heavy Nuclei (IONS) Experiment Support Pedestal, and Payload Bay Utility Bridge.

We completed our design review on the Fluid Loop Pump Support Structure and plan to submit these drawings for baselining in the near future.

Several design iterations on the ATMOS Support Structure were performed in an effort to solve the ATMOS low-frequency problem. A dynamic model of the ATMOS experiment is required for final verification of the ATMOS Support Structure MPE.

Specific requirements for the assembly, installation, and test of the Payload Bay Freon Loop in our A&I facility were identified. We are in the process of identifying specific requirements for the A&I facility equipment to support the MPE Fluid Loop flow test.

TBE/PMIC completed the coordination of shielding and grounding modifications to the fluid loop pump controller with Hamilton Standard. The electrical portions of the draft fluid loop control panel test procedure are being developed.

WBS 75.5 - Environmental System Integration

We completed fluid flow analyses on the adjustable metering valves to be used to replace the fixed orifices in the MPE Fluid Loop and in the MPE Fluid Loop bypass required by the FES/VCGS experiments. Additional thermal analyses with the actual mission Beta angle history were completed and delivered. Technical inputs for and review of the GIRD were completed.

WBS 75.6 - Electrical System Integration

Closure packages for all outstanding DNs resulting from the IPL/MPE FDOR were completed and submitted for approval. The electrical system schematic was revised to include modifications at the T-O umbilical interface and submitted for distribution. MPESS structural and fluid loop pump support drawings were reviewed to assure that electrical bonding requirements were met.

WBS 75.7 - Structural/Mechanical System Integration

The initial integrated Spacelab rack structural and dynamic analyses on the five PMIC racks were completed. We continued to perform model development for rack structural and dynamic analyses on the three experiment developers' (dedicated) racks. All racks analyzed showed negative margins of safety in the Spacelab racks. We are in the process of determining and implementing fixes to the rack and/or interface structure to remove all negative margins of safety.

Safety critical structures were identified for all experiments except ATMOS. We are meeting with Jet Propulsion Laboratory (JPL) on the ATMOS dynamic (frequency) problem and their safety critical structure definition and structural analyses.

WBS 75.8 - Pointing/Stabilization System Integration

The Pointing/Stabilization model documentation (DR IR-40) was completed and delivered on schedule.

WBS 75.9 - Ground Operations Analysis and Requirements Definition

We provided data packages for and supported and participated in five individual experiment GORs. The experiment IIA Section 10s were updated and the IPL GOR issue of the GIRD was finalized for reproduction and distribution. A total of 61 GIRD DN closures were submitted with only two remaining outstanding due to PI late response. The major portion of the Part IV updates was applicable to the Research Animal Holding Facility (RAHF) experiment. ECOS was also added to Part IV during this period.

WBS 75.10 - Safety and Quality Assurance

Acceptance of the Fluid Loop Pump modification at Hamilton Standard occurred.

Materials were developed and a presentation made at the SL-3 Phase II Safety Review at JSC. The review was held on December 6-7, 1982.

WBS 75.11 - Configuration Management

SL-3 Configuration Change Coordination and Processing activities during this period encompassed extensive participation in internal TBE/PMIC design reviews preparatory to release of drawings for MSFC technical review and pre-baselining action. These reviews concentrated primarily on the Utility Bridge Assembly, Payload Adapter Structure, IONS Support Pedestal Assembly, and Fluid Loop Control Panel drawings. We released the Fluid Loop Control Panel drawings and the four CEI Part I Specifications for MSFC technical review. We also baselined and released the Underfloor Mockup drawings.

We continued to process and track activities associated with the closure of SL-3 IPL IDE and IPL FDOR data package DNs. We participated in a MSFC DN status meeting on January 6, 1983, and provided information reflecting the current status of all open DNs.

We prepared a letter for JA21 signature that distributed the SL-3 Software Preliminary Design Review (PDR) data package to specified participants. We received 22 DNs against this data package, assigned DN numbers, entered appropriate information into SCIT and forwarded the 22 DNs to MDTSCO for preparation of contractor comments.

We received and initiated action to respond to C/O Mod MSFC-186. This modification directs that TBE/PMIC perform specified actions to log and track Space Shuttle Change requests that impact SL-3 payloads and attend the JSC Level II PRCB meetings (telecon).

WBS 75.12 - Interface Agreements

The Geophysical Fluid Flow Cell (GFFC), Mercury Iodide Crystal Growth (MICG), and Urine Monitoring System (UMI) IIAs were submitted to SPP0 for baselining. The remaining IIAs are scheduled to be released prior to February 8, 1983. Approximately 90 percent of the DNs against the IIAs have been closed.

WBS 75.13 - Integrated Payload Compatibility

A revision to the IPRD was completed and is being released as an ECR. This ECR incorporates the IPL FDOR DNs and other mission changes that have occurred since baselining. A major effort was directed to the revision of the mission staging requirements. PMIC participated in several meetings of the Staging Requirements Study Group, established by the IPL FDOR Board, in which the staging requirements and proper methods of documentation were established.

SL-3 verification activity decreased during this period with only 11 verification items submitted for review. The Drop Dynamics Module (DDM) Integration Readiness Review (IRR) originally scheduled for January was rescheduled. It appears that several experiment IRRs will be rescheduled, and this could cause a schedule problem for PMIC in preparing the verification data for the IPL IRR.

WBS 75.14 - Mass Properties

The SL-3 Mass Properties Quarterly Report #16 was submitted during this period. The SL-3 data base was revised to incorporate IPL FDOR DNs and the MPE masses.

WBS 95.0 - PAYLOAD FLIGHT OPERATIONS INTEGRATION

WBS 95.2 - POCC Requirements

Section 11, Flight Operations, of the IIA for each experiment was updated and submitted for inclusion in the baseline issue of the documents. We met with the PI for the MICG experiment and participated in telecons with the PIs for the Ames Research Center Life Sciences Payload (ARCLSP), FES/VCGS, DDM, and GFFC experiments. The meeting and telecons resulted in updating the DRFs for these experiments, particularly in the area of GSE accommodations in the POCC.

WBS 95.3 - Payload Data Processing Requirements

The package of DRFs specifying the post-mission video product requirements was assembled into document form and submitted to the SPPD for approval.

7. OSTA PARTIAL PAYLOADS

WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

WBS 35.1 - Mission Peculiar Equipment (MPE)

The OSTA-2 MPE was completed this period. MPESS SN001 was painted on November 1, 1982, and the Structural/Mechanical MPE was painted on November 15, 1982. After weight and C.G. testing of the MPESS, the Structural/Mechanical MPE and MAUS canisters were fit-checked to the MPESS. The electrical cable harness was fit-checked and reworked to allow for longer lengths to the MAUS cans. The enlarged bathtub fittings were completed on January 9, 1983, and installed on the MPESS. The wing fitting reinforcements were already installed on the MPESS. These installations completed the MPESS. The OSTA-2 shipping configuration was completed and shipped to KSC on January 10, 1983, to arrive there on schedule, January 12, 1983. Retrofit bolts to attach the bathtub fittings arrived at TBE on January 11, 1983, and will be shipped to KSC the week of January 17, 1983. Eight bolts for the trunnion attachment to the MPESS are to arrive at TBE on January 19, 1983. Upon acceptance, they will be shipped to KSC.

MPESS SN002, whose completion is being funded by OAST-1, was repainted on December 3, 1982, and shipped to JSC on December 13, 1982.

Several electrical connectors were ordered for Mid-Deck missions. Delivery dates for the connectors are unknown at this time.

WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

WBS 75.2 MPE Design

We participated in the OSTA-2 acceptance review presentations. Revised critical initial flaw size (CIFS) for the OSTA-2 MAUS can attachment pins were calculated in response to a request from the FCB.

OAST-1 MPE stress analyses are in progress. Areas requiring improvements were redesigned. The on-orbit thermal deflections and "lg to Og" deflections for the Dynamic Augmentation Experiment (DAE) Sensor Head attachment MPE were completed. Assessment of the effect of these deflections on the sensor head alignment was started. Also, an assessment of the joint movements (due to design tolerances) and their effect on the sensor head alignment was started. Detailed drawings for OAST-1 MPE are in progress and are 25 percent complete. The portions of the MPE CEI Specification (Part II), DR IR-02, and the Design Review Package for MPE, DR IR-27, for the electrical system for the OAST-1 IPL/MPE FDOR were initiated. An April 1983 delivery is planned.

We started the MEA-1 drawings and documentation for the FDOR data package.

Design modifications for the generic MPESS (SN003 and subsequent) were completed. Stress analyses and detail drawings were also prepared. ECP 75F was prepared to reflect the above changes. We performed analyses and participated in the test for the determination of C.G. location of MPESS SN001. The test requirements document for the generic MPESS Keel Fitting Adapter was finalized, the test fixtures were designed, the stress was analyzed, and drawings were prepared.

WBS 75.3 - Command/Data/Communication Subsystem Integration

We responded to RIDs from the November 1982 OAST-1 IPL IDE. We added notes to IPRD Tables 10-1 and 10-2 to explain the difference between payload and subsystem measurement/stimuli ID (M/SID) numbers.

We met with MSFC Flight Operations Branch personnel (A. McNair, H. Hooper) to discuss OAST-1 POCC Requirements and inputs to POCC Annex 5. It appears that a question has arisen as to whether the POCC terminals will be available for OAST-1 real-time monitoring, as assumed. H. Hooper wrote an addition to the PIP, outlining MSFC's requirements, and is awaiting formal JSC response. There has been some indication by MSFC personnel that the HOSC may be used instead of the POCC.

We confirmed that the proposed modification to SCCF to allow monitoring of its Data System and Alignment Monitor is compatible with the

OAST-1 FMDM. As a result, two 28V discrete outputs and two 28V discrete inputs were added to CDMS documents pending formal direction.

We assisted in drafting a memo (January 6) to R. McAnnally requesting direction regarding several CDMS issues, including SAE and DAE serial downlink, SAE downlink additions via connector J13, and VCS Impulse Indication command incompatibilities. The plan is to have a meeting on January 19 on this subject.

We met with G. Young (SAE Principal Investigator), R. McAnnally, and G. Hawkins regarding Mr. Young's request for adding SAE data to the OAST-1 downlink. A list of desired data was distributed, and an initial assessment shows that the parameters and the assumed FMDM sample rate (1 sps) are within the 800 bits/second downlink standard accommodation. However, the total number of FMDM acquired parameters (48) including the two added SCCF measurements, now exceeds the standard allowance of 40.

A memo (PMIC-EXT-P341-001(83)) on January 14 was written to G. Hawkins, outlining our plan to add the compatible analog data at SAE J13 to PIP Annex 4. A compatibility assessment showed that only 15 of 35 requested measurements were hardware compatible with the FMDM.

WBS 75.4 - Command and Data Requirements

We have continued the development of the data base for generation of OAST-1 PIP Annex 4 tables. We have completed building 15 formats for inputs to the JSC Payload Data Base (Appendix B) using off-line microcomputer data base software. Also, we have begun inputting the latest command/data requirements for OAST-1 mission in the data requirements for OAST-1 mission in the data base.

WBS 75.5 - Environmental System Integration

The OAST-1 on-orbit thermal model was updated to reflect design changes since the October IDE analysis. Additional detail was added to the DAE Sensor Bracket and DAE Support Struts to increase thermal accuracy. Ascent and descent models are being developed to supplement the on-orbit analysis for the FDOR. Currently, TRASYS form factor computer runs are being made for the OAST-1 design cases. A detailed SINDA model was

developed for the PCB to assess the effects of thermal isolation and to determine the required heater power.

WBS 75.6 - Electrical Systems Integration

All outstanding DNS generated in the OAST-1 IPL/MPE IDE were completed and closure documentation was submitted for approval. A revision of experiment IIAs, the cable interconnect diagram (CID), and the electrical system schematic was initiated in preparation for the IPL/MPE FDOR schedule in April 1983.

Development of the MEA-1 IPL/MPE FDOR data package was initiated with revisions of electrical sections in the IPRD, IIA, PIP Annex, and unique ICD. The DR IR-04 Part I Specification was revised for word processing, and the cable interconnect diagram and electrical system schematic revised for drafting.

WBS 75.9 - Ground Operations Analysis and Requirements Definition

For OSTA-2, the work required by C/O Mod MSFC-178 was initiated to define the deintegration requirements and create a Part V to the GIRD. An ECR was prepared and submitted to add GIRD requirements/constraints to configure the MAUS switches on the SSP. MPESS SN001 was moved into the A&I facility and fit-check/buildup activities were started on December 1, 1982. Some minor problems were encountered and corrected. SN001 fit-check/buildup was completed on December 22, 1982, and the OSTA-2 Shipping Configuration was delivered to KSC on January 12, 1983, as scheduled.

Current effort being expended for OAST-1 is in DN incorporation and preparation of the GIRD for the FDOR. A total of 95 of 104 DNS received have been incorporated into the GIRD.

Development of the MEA-1 GIRD from the OSTA-2 GIRD is continuing.

WBS 75.10 - Safety and Quality Assurance

Acceptance Data Reviews of MPESS SN001 and SN002 were completed.

Materials were developed and a presentation made at the OSTA-2 Phase III Safety Review at JSC. The review was held the week of December 9, 1982.

WBS 75.11 - Configuration Change Coordination and Processing

We continued to process all ECRs and ECPs against the current OSTA-2 and OAST-1 baselines. This included preparation of PCN folders, processing of change evaluation requests, tracking changes in SCIT, and preparing CCBs. We published a biweekly Partial Payload Open Action Report, K32A, which lists all outstanding open actions against OSTA-2 and OAST-1 baselined documentation.

For OSTA-2, we published the monthly TBE DRL reflecting all MPE CEIs being built by TBE. We baselined the MPSS Spool Test Drawings and Parts list and assembled and delivered the required drawings, parts lists, and manuals for inclusion in the OSTA-2 MPE Acceptance Data Packages.

We submitted the following OSTA-2 ECPs: TBE 69F, OSTA-2 MPSS Control Weight Change (Increase); TBE 74F, OSTA-2 Kit Alterations. ECP TBE 69F has been evaluated by S&E and is in the Partial Payloads Level II CCB approval cycle, whereas ECP TBE 74F is currently being evaluated by S&E.

We performed the DN control functions for the OAST-1 IPL IDE. These functions included the assignment of DN numbers and the distribution, coordinating, and tracking of all DNs received. A total of 192 DNs was processed with 159 approved, seven disapproved, 15 assigned for study, and 11 withdrawn. We provided secretariat support for both the preboard and board meetings, and continued to track the OAST-1 DN open actions and published them in the monthly Partial Payload DN SCIT Report, K062.

We submitted the following two OAST-1 ECPs to SPO: ECP TBE 65F, Add Requirements for Dynamic Augmentation Experiment; and ECP TBE 68F, Revision to the MPSS Design to Accommodate the Long Spigot ESA Keel Fitting. Both of these ECPs are currently being evaluated by S&E.

We performed the DN control functions for the MEA-1 IPL IDE by assigning DN numbers and distributing, coordinating, and tracking all DNs received. A total of 31 DNs was processed with 20 approved, seven assigned for study, and four withdrawn. We provided secretariat support for both the preboard and board meeting, continued to track the MEA-1 DN open actions, and to publish these open items in the Partial Payload DN SCIT Report, K062.

We finalized and submitted our response to C/O Mod MSFC-170, which superseded C/O Mod MSFC-151 and directed that PMIC perform Level II Configuration Management functions for the Mid-Deck Payload Missions. We continued to track activity directed toward the closure of DNs submitted against the ARC IPL RR data package. We processed and entered into SCIT closeouts for six of the 22 ARC DNs. We processed ECR EL62-0006 against the Isoelectric Focusing Experiment (IEF) Integrated Payload Requirements Document (IPRD), JA-214. We prepared the Level II Configuration Control Board Directive which approved the ECR as written and directed that EL62 issue IPRD document replacement pages and change log to the MSFC documentation repository.

WBS 75.12 - Interface Agreements

ECR TBE4-0103 proposing revisions to the baselined OSTA-2 MEA IIA, JA-055, was submitted and approved. The ECR corrected absorptivity coefficients for the experiment and support platform and added the requirement for redundant shutdown of the experiment.

ECR TBE4-0108 was prepared to revise the SCCF IIA thermal analysis data and ground operations section.

Closeouts were submitted on most of the approved DNs written against the SAE IIA ECR TBE4-0094 included as part of the OAST-1 IPL IDE data package. This ECR will be revised to incorporate the DN issues which have been resolved and reissued for approval.

The DAE IIA, JA-085, is being updated with the new constraints and requirements identified since the OAST-1 IDE version of the document was prepared. The IIA will then be presented for baselining.

The OAST-1 Payload Integration Plan, JSC-14062, was reviewed as requested by SPPO and redlined to reflect the latest Payload requirements. It was submitted to SPPO on January 3, 1983.

The MEA-1 Payload Physical Interface Definitions for Get-Away Special (GAS) Payloads, JA-296, was discussed with GSFC by telecon on

December 3, 1982. The following items were agreed upon and the document will be changed to reflect these agreements:

- Add a thermal insulation boot for the electrical cable protection to each GAS canister;
- Revise the geometry configuration of the center-of-gravity for each GAS payload;
- Remove the TBD part numbers for the GAS Payload and add GSFC part numbers;
- Add a Cho-therm insulator between the GSFC GAS Payload canisters and the attaching MPE longerons.
- Revise document to reflect that MSFC will furnish the bonding strap between each GAS can and the MPE support system.

WBS 75.13 - Integrated Payload Compatibility

The closeout of all outstanding DNs against all reviews of the OSTA-2 integrated payload was completed. We submitted ECR TBE4-0104 to the OSTA-2 IPRD to incorporate the provision for a redundant manual shutdown, and completed the document update following CCBd approval.

There were two open MEA (Instrument) verification requirements after the MEA IRR. These verification requirements 4.5.2 and 4.5.4.2 have now been closed.

A fracture analysis of the OSTA-2 MAUS Cans was submitted to the MSFC FCB as a PMIC-ANAL document. The analysis was of the MAUS Cans only; no MPE included. Cans are not subject to fracture since cracks large enough to cause a problem are precluded by the leak test performed on each can. However, the FCB has requested that this analysis be published as a DR IR-56 document.

The MPESS SNO02 generic loads fracture control analysis (DR IR-56) was approved for MPESS SNO01. The approval was granted by the MSFC FCB in Memo EP01(82-352).

The MSFC has requested that minor changes be made to the OSTA-2 Fracture Control Plan (see memo EP01(82-395). These changes are in the process of being made.

The OSTA-2 Shipping Configuration was shipped on January 10, 1983, and arrived at KSC early on January 12, 1983. Items shipped short were eight trunnion bolts and 32 bathtub fitting bolts.

As of January 15, 1983, open verification items were as follows:

MPESS SN001

- 4.1.3.1.1 Structural Design Factors of Safety
- C5.1 Cleaning and Packaging
- C5.2 Packing
- C5.3 Marking and Shipping

MPESS SN001 GHE

- A3.3.4 Cleanliness Certification
- A3.4.1 HFA to MPESS Interface

OSTA-2 S/M MPSS

- 4.2.1.2 Grounding and Isolation

Following the OAST-1 IPL IDE data package review, we coordinated the response to 192 DNs. We presented an OAST-1 IDE System Overview to the board meeting on December 16, 1982, and began coordination of DN closeouts for actions assigned to TBE/PMIC from team, preboard, and board meetings.

We began update of the OAST-1 IPRD, PIP Annexes #1 and #6, and inputs to the STS/Payload Unique ICD in preparation for the OAST-1 IPL FDOR scheduled for April 4, 1983.

A memorandum outlining some of the issues which should be resolved prior to development of an OAST-1 IPL FDOR data package was prepared.

The Metallic and Non-metallic Materials List (DR IR-36) for MEA-1 was approved by MSFC.

The MLR (STS-6) IRR was held on December 10, 1982. This review resulted in eight open items, including eight instrument and seven

integrated verification requirements. One instrument (4.2.1.5) and one integrated (3.1.3) verification requirement have been closed since IRR which closed one of the open items. Four of the seven remaining open items are scheduled to be completed at KSC. The remaining three open items are to be completed prior to shipping the MLR to KSC. PMIC-IR52-3598, Instrument Summary Verification Report, and PMIC-IR51-3597, Integrated Payload Summary Verification Report, were prepared and submitted to SPP0.

WBS 75.14 - Mass Properties

The OSTA-2 Quarterly Status Report, PMIC-IR05-1493-19, was submitted in December 1982 prior to the actual measurements made using the OSTA-2 MPESS. The OSTA-2 MPESS Shipping Configuration was measured on December 21, 1982, and actual mass properties results were reported in PMIC-IR05-3612 as part of the acceptance data package. The kits shipped with the OSTA-2 MPESS were not weighed but are considered as part of the shipping configuration. An updated OSTA-2 Actual Mass Properties Report will be issued in February 1983 to include the measured data.

The OAST-1 and MEA-1 data files were updated based on revised/updated data and drawings.

8. OSS-4 MISSION

WBS 05-4 - Special Studies

PMIC Study 3526, "Final Report for OSS-4 Mission Cruciform Study," was submitted to MSFC in November 1982 in response to TD-JA02-82-11.

WBS 75-1 - Configuration Design Definition

Using available thermal data, deflection analyses were performed to evaluate the effect on alignment and long-term stability of locating instruments in different positions on the Cruciform.

In an effort to relieve pallet overloads, computer modeling and analyses were performed on numerous strut assemblies to redistribute the hardpoint loads.

Drawing layouts were done to achieve an improved OSP viewing angle and establish instrument interface requirements.

WBS. 75.12 - Interface Agreements

IAs are being prepared for the UIT, HUT, and WUPPE experiments. Reviews to compile a first draft are in progress with S&E. Updated copies of each IIA will be forwarded to each PI during the week of January 17, 1983.

WBS. 75.13 - Integrated Payload Compatibility

Following the OSS-4 Trade Study's choice of a cruciform configuration, preliminary system integration work has proceeded on the following:

- Thermal analyses study for optimum coalignment of each telescope and the OSP;
- Wide-field camera mounting options;
- Experiment electronics/radiator configuration and mounting;
- OSP mounting compatibility analyses;
- Telescope Mounting compatibility analyses.

During this period, telescope mounting locations and their definitions were presented to each PI. Also, an apparent OSP mounting design deficiency was identified and will be formally documented through the submittal of an ECR.

9. PREMISSION DEFINITION

The closeout activities for the MEPHISTO Facility Accommodations Assessment requested in TD-JA02-82-18, dated July 19, 1982, were accomplished during this reporting period (the final review having been accomplished in the closing days of the prior reporting period). The closeout activities included the submission of the draft final report on November 19, 1982, review by the customer, coordination of updates, comments and suggestions by the customer review team, incorporation of coordinated items into the report, and the submittal of the final report under TBE Technical Letter SP-SPP0-255, dated December 14, 1982.

Suggested cost-saving procedures and techniques were compiled from interviews with payload integration personnel and are being consolidated. An overview of Spacelab 6 integration cost estimates and their basis is being developed for presentation on January 19, 1983. Descriptions of suggested cost-saving procedures and guidelines will be presented. A cost/benefit analysis of the suggestions, as they apply to SL-6 and future missions, will be included.

Work on the SL-6 Mission Schedule Development study directed by TD-JA11-82-60, dated December 7, 1982, is nearing completion. Work on this study, which involved 240 manhours of effort, began on December 16th. The study is comprised of four tasks:

- The development of a schedule for the SL-6 mission, based on a May 1987 launch;
- The definition of all MPE hardware necessary to integrate and perform the SL-6 mission and identification of those MPE items which will fly on earlier Spacelab missions (e.g., SL-1) and, therefore, could be candidates for reflight on SL-6;
- The development of a procurement schedule for the MPE hardware items defined for SL-6;
- The generation of cost estimates, by hardware item, for the SL-6 MPE.

All of these tasks were completed and a data package was generated which defines the required SL-6 mission and MPE hardware procurement schedules, together with the MPE hardware list and procurement cost estimates.

10. MISSION PECULIAR EQUIPMENT SUPPORT STRUCTURE

WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

WBS. 35.1 - Mission Peculiar Equipment (MPE)

Piece part manufacturing for MPESS SN003 and SN004 continued. Forgings for machined end fittings for these and subsequent MPESSs were received the second week in January.

WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

WBS 75.11 - Configuration Change Coordination and Processing

ECP TBE 63F, MPESS End Fitting Redesign for Serial No. 003 and 004, has been approved; however, a follow-up ECP is required to reflect the detail design and new configuration.